

FIG. 1

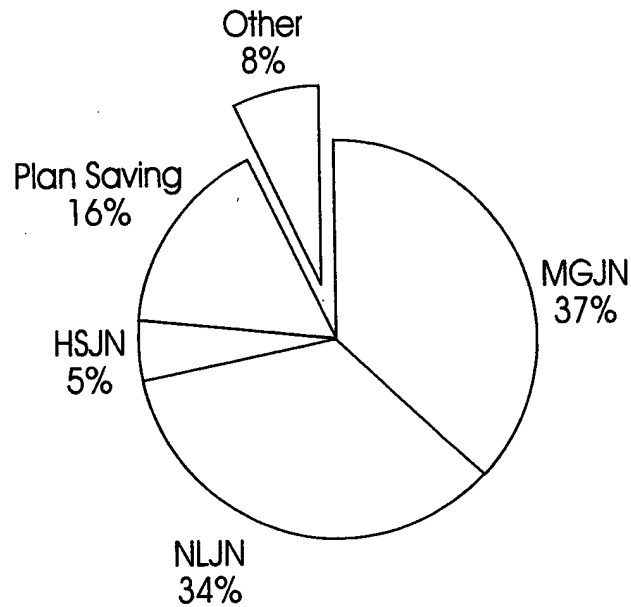


FIG. 2



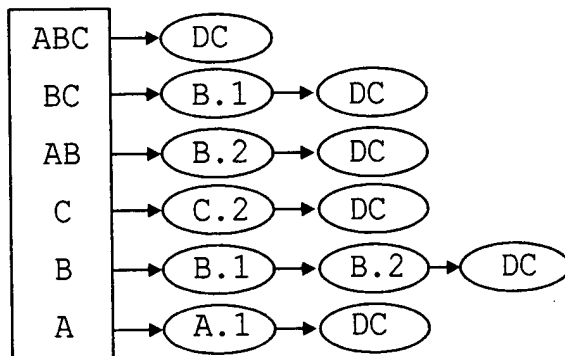
Both Queries Have 4 Joins

(A, B) (B, C) (A, BC) (AB, C)

Select A.2
From A, B, C
Where A.1 = B.1
and B.2 = C.2 ;

Select A.2
From A, B, C
Where A.1 = B.1
and B.2 = C.2
Order By A.2 ;

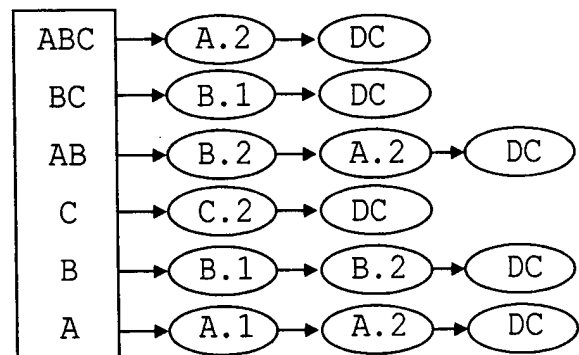
MEMO Structure



Number of Plans = 12

FIG. 3A

MEMO Structure



Number of Plans = 15

FIG. 3B



```
initialize(S)
input S: a MEMO entry
begin
  Allocate an interesting property list for S.
  If (S is for a single table)
    populate interesting property list for S based on
    the generation policy of P
end

accumulate_plans(S, L, J)
input S,L: MEMO entries of two table sets to be joined
output J: MEMO entry of the joined table sets
begin
  define  $list_s$ ,  $list_l$  and  $list_j$  to be the interesting
  property list of S, L and J respectively
  For each property  $p$  in  $list_s$  and  $list_l$ 
    if ( $p$  can be propagated by at least one join method)
      if ( $p$  has not been retired by the join AND
         $p$  is not equivalent to any property in  $list_j$ )
        add  $p$  to  $list_j$ 
  For each join type  $t$ 
    accumulate join plans in  $join_t$ 
    if ( $t$  fully propagates  $P$ )
       $join_t += |list_s \cup list_l|$ 
       $join_t += 1$  (for DC property)
    if ( $t$  partially propagates  $P$ )
       $list_p = \{p | p \in list_s \cup list_l, t \text{ propagates } p\}$ 
       $list_c = \{p2 | p1 \prec p2, p1 \in list_p, p2 \in list_s \cup list_l\}$ 
      ( $list_c$  is the coverage list)
       $join_t += |list_p \cup list_c|$ 
    if ( $t$  doesn't propagates  $P$ )
       $join_t += 1$ 
end
```

FIG. 4

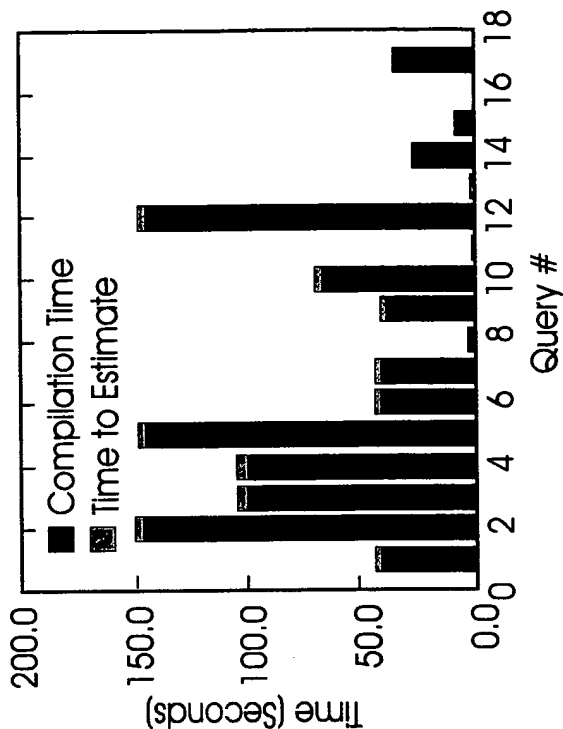


FIG. 5A (a) linear_s

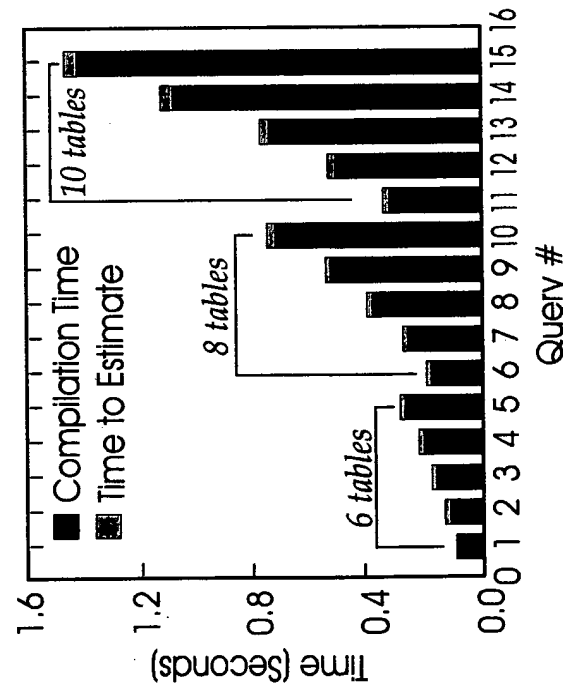


FIG. 5B (b) real2_s

Actual Time	Time to Estimate	Pctg
17.010	0.115	0.7%
1.103	0.031	2.8%
4.353	0.022	0.5%
12.670	0.085	0.7%
1.771	0.0203	1.1%
11.161	0.038	0.3%
11.157	0.035	0.3%
1.350	0.0173	1.3%

FIG. 5C

(c) real1_p

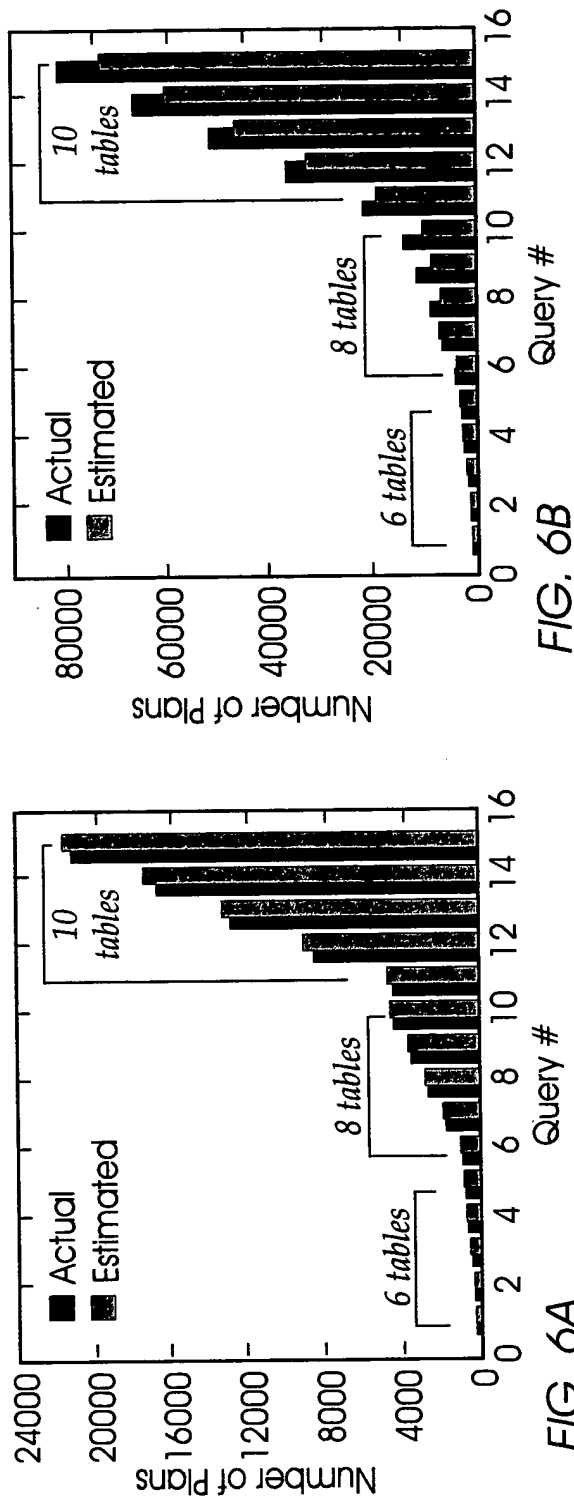
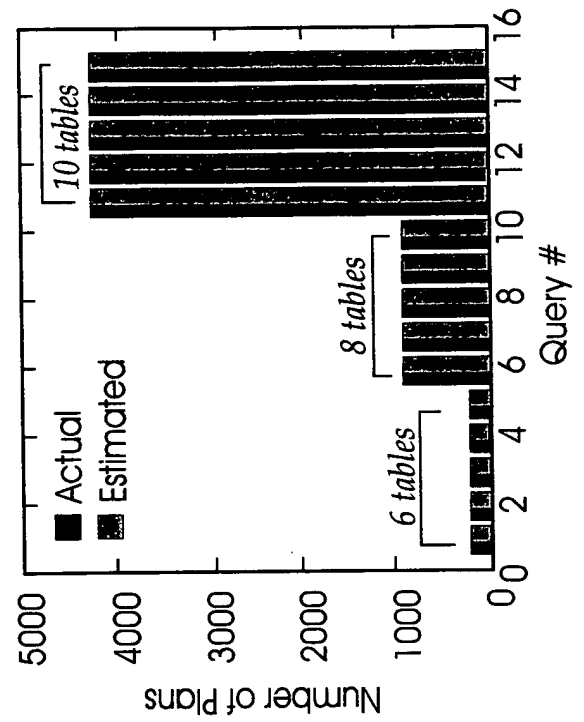


FIG. 6B



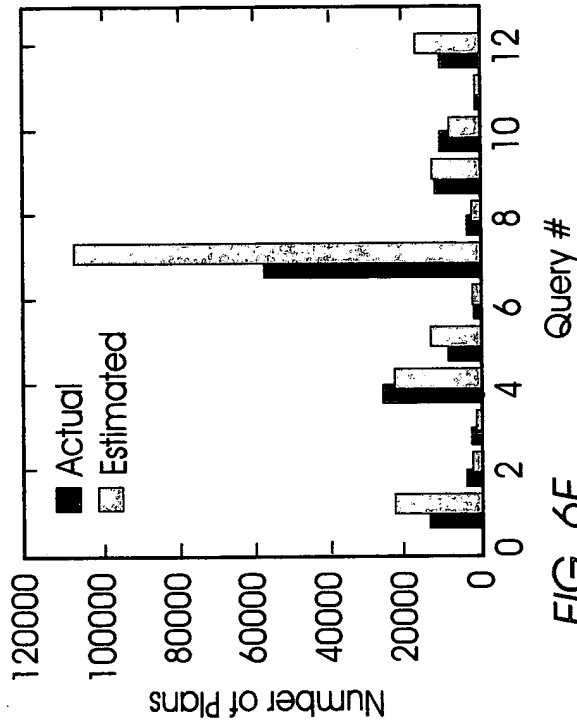


FIG. 6E

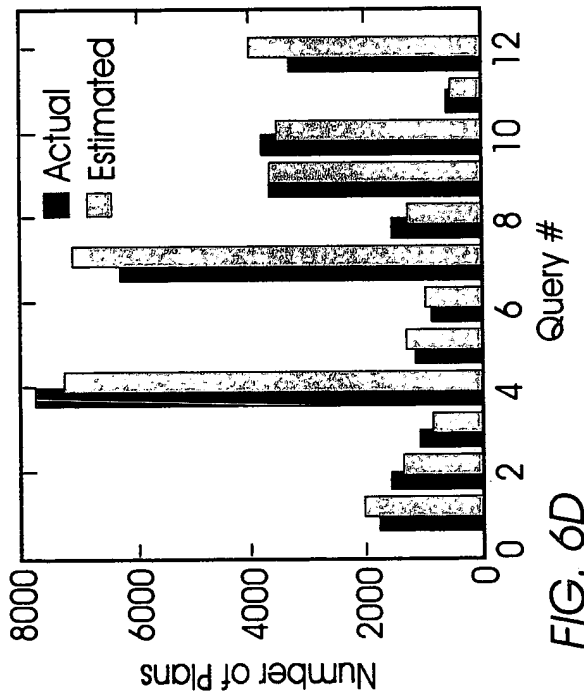


FIG. 6D

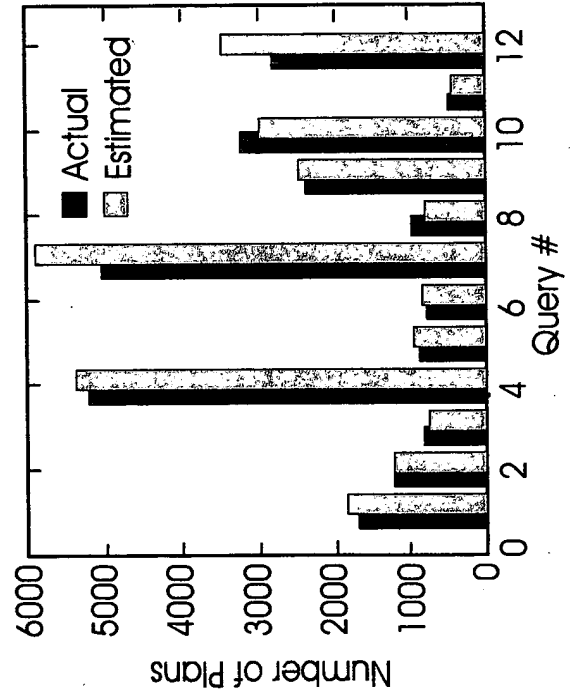


FIG. 6F

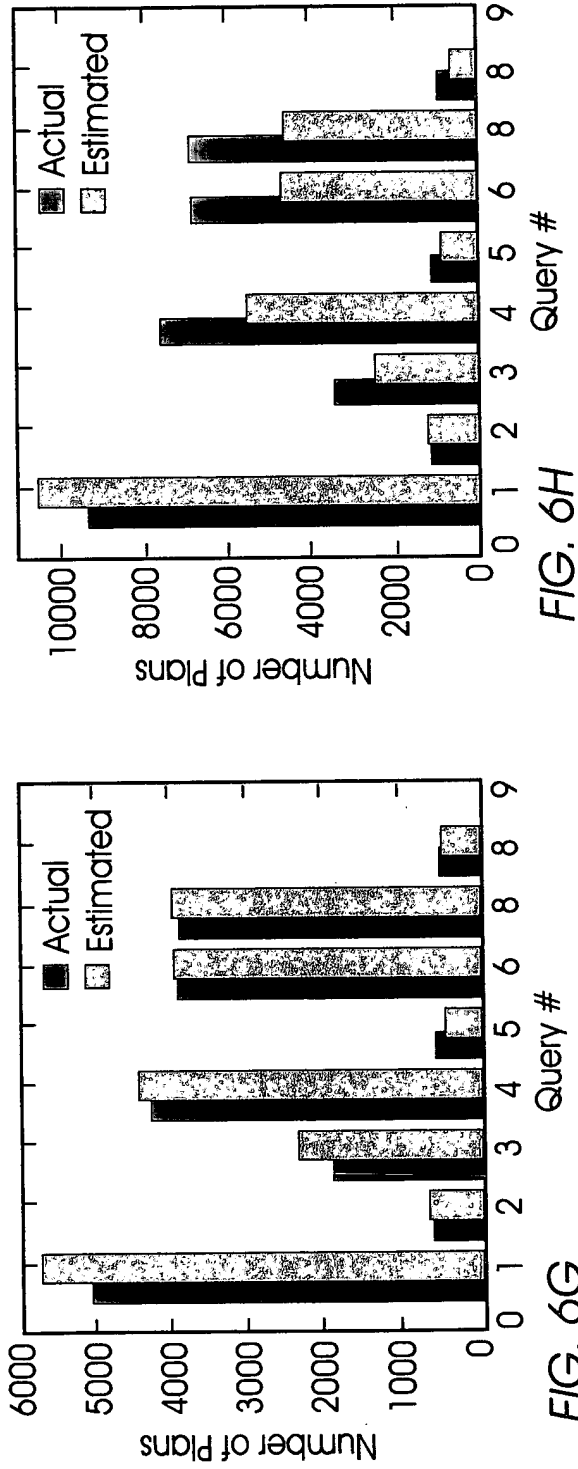


FIG. 6G

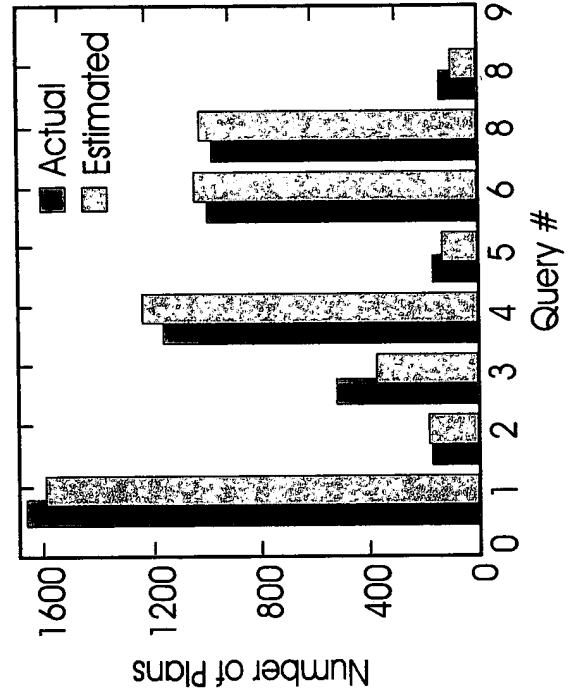


FIG. 6I

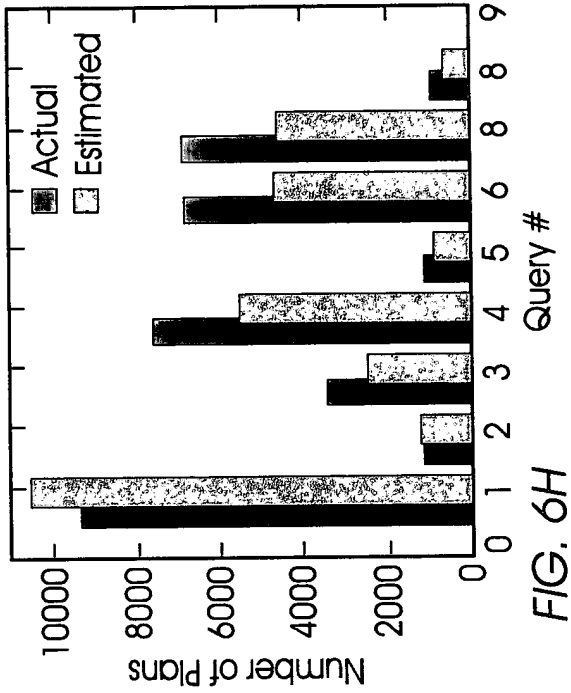


FIG. 6H

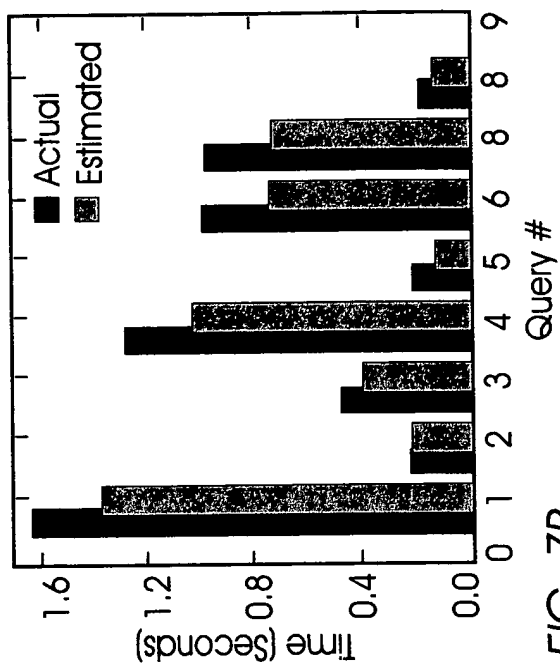


FIG. 7B

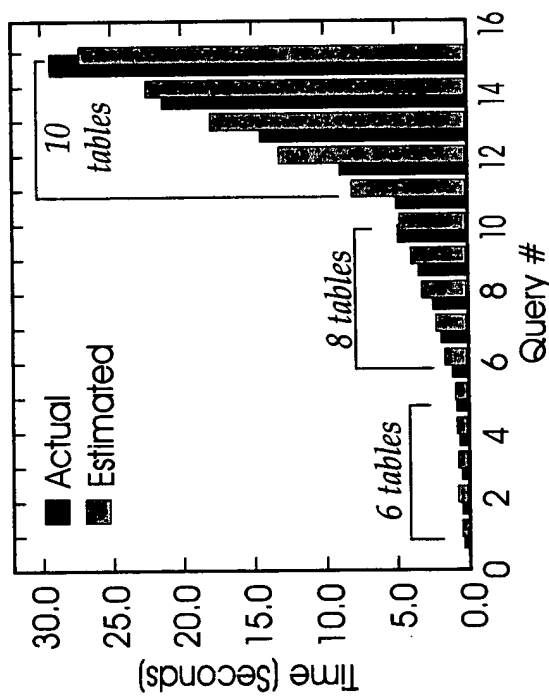


FIG. 7A

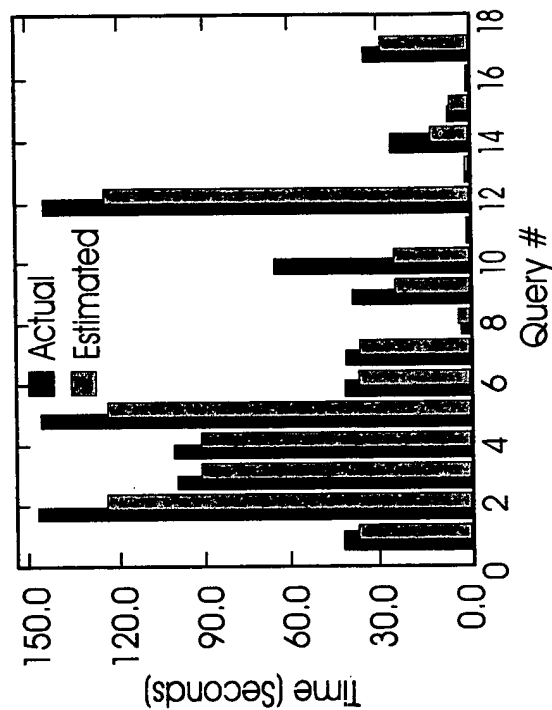


FIG. 7C

